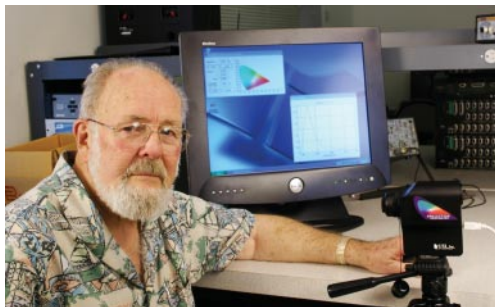


MAINTAINING HIGH QUALITY ON-SCREEN PROJECTION

by Roger Hibbard



Roger testing the PCA

Entertainment is the product. The entertainment value of movies is strongly influenced by the quality of presentation. Bright, high contrast and sharp images are required for quality presentation. A projection system that provides such images projects the movie as intended by the director.

Brightness is very important, as well as the light uniformity across the screen and the matching of projectors where two are used. For video projection, the color balance is also crucial in order to present proper flesh tones and to give the right degree of warmth or coolness to the scene.

There are a number of factors that work against the maintenance of high quality projection. Among these are: inadequate maintenance, xenon bulb aging, variations in bulb current, improper adjustments when a xenon bulb is replaced, screen aging and lamp house reflector aging.

Measurements of the light level and the light dis-

tribution across the screen need to be made during installation and on a routine basis thereafter. The normal pattern of light on the screen consists of the brightest area in the center with light levels decreasing ten to twenty five percent toward the corners and sides. This pattern and its specified values are established in recommended practices by the SMPTE (Society of Motion Picture and Television

Engineers). Traditionally, the measurements have been made with a spot meter, measuring the luminance at various points on the screen and adjustment of the lamp house accordingly. This was a tedious iterative process. The PSA (Projection System Analyzer) has become the standard method of measurement during the last few years. This approach saves a lot of time in making adjustments and it improves accuracy.

The PSA consists of a specially designed video camera in conjunction with the user's laptop computer that gives a real-time continuous readout of the light pattern on the entire screen. (See figure one). The PSA measures the luminance (brightness) in 45 zones of the screen and displays the results in a nine-by-five zone pattern as shown in figure two. The differences in light level from one zone to the next are exaggerated in the gray background for each zone, making it easy for a person to see the light pattern and to make the appropriate adjustments. The human eye is a very poor light-measuring device since it tends to accommodate to any light level. Very few people can look at a well lit, blank screen and accurately tell what the light level is, much less determine the amount of variation in light across the screen. The PSA does this for you with great accuracy.

The PSA stores a report for each set of measurements and makes that report available for hard copy and quality control purposes.

USL (Ultra Stereo Labs) received an Academy Award in 1997 for the development of the PSA.

Video projectors exhibit the same light level problems that film projectors do. In addition, they are subject to maladjustment of color balance. When a film image is projected on the screen, the color characteristics of the image are primarily dependent on the film itself. Video projectors, on the other hand, interpret the digital input and present a color rendition according to their internal algorithms and adjustments. If the color balance is slightly off, flesh tones will be in error and

the warmth or coolness of scenes will suffer.

Adjustment of video projectors is usually accomplished using a color meter as well as the PSA. The color meter is a spot meter that measures color characteristics as well as luminance. Several color meters

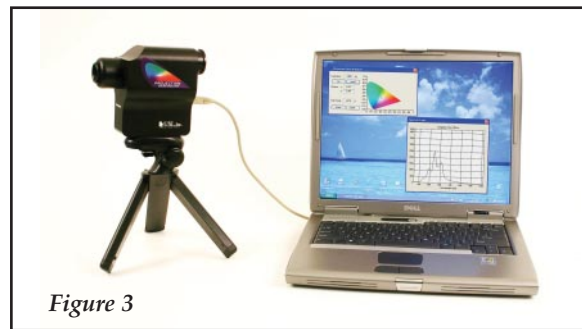


Figure 3

are available on the market.

USL manufactures a very accurate color meter for this purpose. It is the PCA-100 or Projection Color

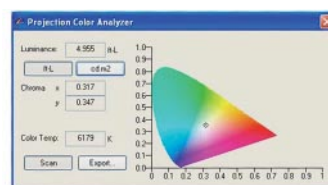


Figure 4

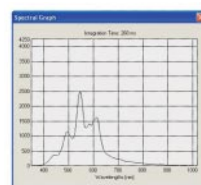


Figure 5

Analyzer. (Figure three). The PCA measures both color and luminance and displays the results on the user's laptop computer. (Figure four). The color measurements are indicated in terms of the coordinates x and y as well as the color temperature. The luminance value is shown in either ft-Lamberts or candelas per square meter. The PCA can also display a graph showing the spectral characteristics of the light versus wavelength. (Figure five).

The PCA viewfinder shows a seven-degree view of the screen area. The measurements are made within a one-degree spot, as indicated by a small circle in the center of the viewfinder.

The PCA has been tested by an independent laboratory as well as by Texas Instruments Inc. It meets the requirements of the SMPTE recommended practices and proposed standards.

The SMPTE has established standards and recommended practices for measurement of all projection system parameters. The Recommended Practice for luminance measurement is RP 98-1995. The proposed standard for color measurement is ANSI/SMPTE Std. 196E.

A high quality of movie presentation can be established and maintained through a proper maintenance schedule and the use of appropriate measuring instruments.

Such a program reduces maintenance costs in the long run and builds clientele satisfaction and confidence.

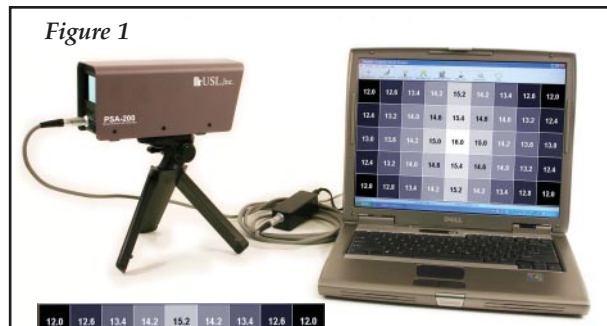


Figure 1

12.0	12.6	13.4	14.2	15.2	14.2	13.4	12.6	12.0
12.4	13.2	14.0	14.8	15.4	14.8	14.0	13.2	12.4
13.0	13.8	14.2	15.0	16.0	15.0	14.2	13.8	13.0
12.4	13.2	14.0	14.8	15.4	14.8	14.0	13.2	12.4
12.0	12.8	13.4	14.2	15.2	14.2	13.4	12.8	12.0

Figure 2